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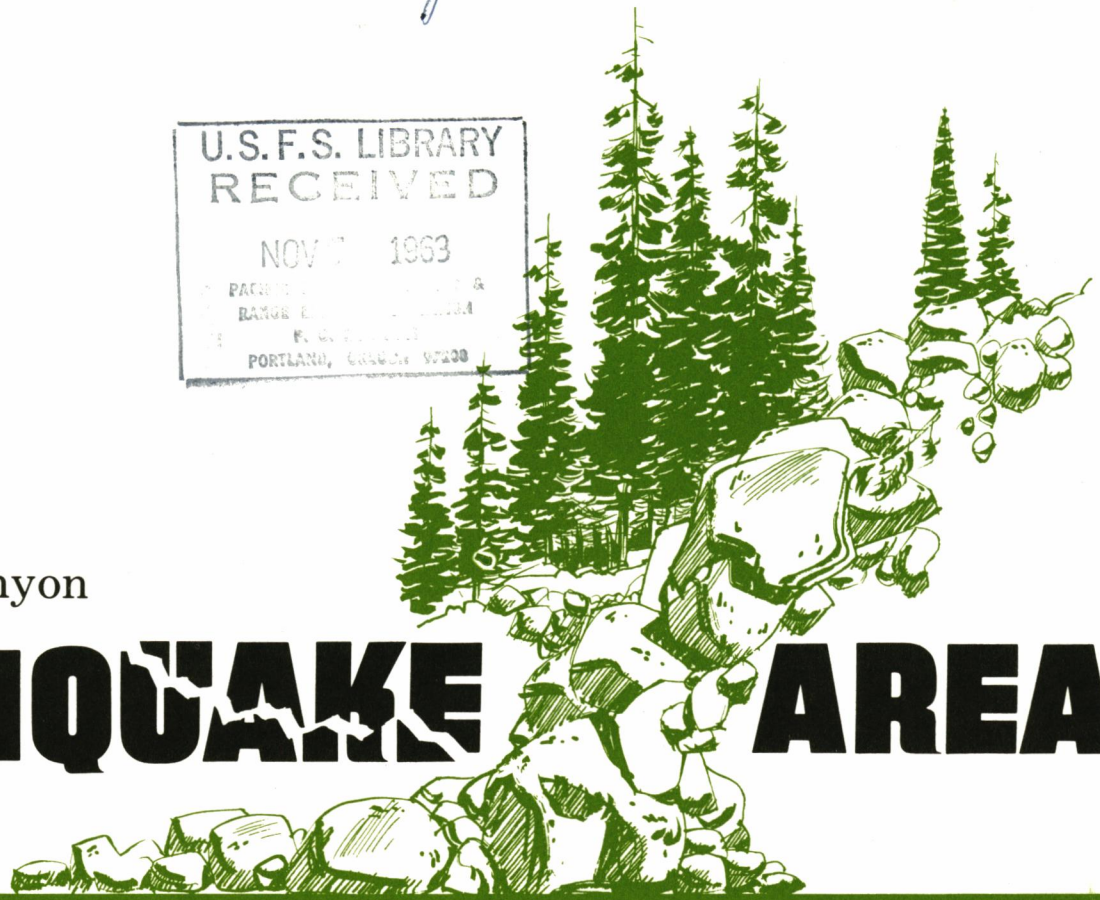


Madison River Canyon

EARTHQUAKE AREA

U. S. DEPARTMENT OF AGRICULTURE • FOREST SERVICE • NORTHERN REGION • MISSOULA, MONTANA

MAN'S EFFECT UPON NATURE

Your visit to the
Madison River Canyon

EARTHQUAKE AREA

Whether you stay an hour or a week, your visit to Madison River Canyon Earthquake Area in southwestern Montana should be interesting and pleasant. Natural beauty, lots of fishing, and the easy-to-see effects of one of the world's stronger earthquakes makes this one of the West's outstanding attractions.

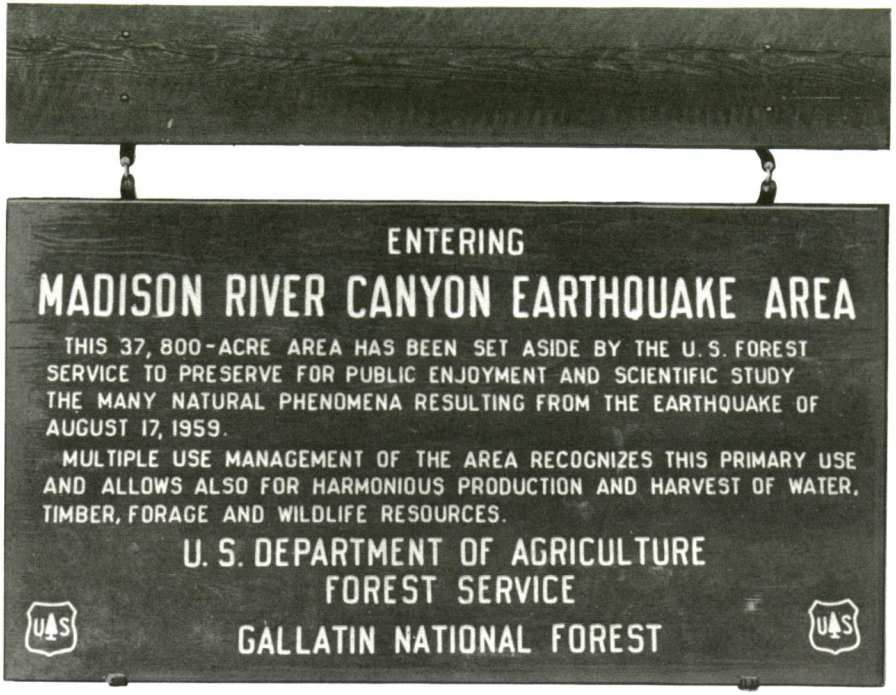
Signs and displays will help you enjoy the things you see. Roads and trails have been built and more are to be added to improve access and use. Forest Service personnel are stationed in the area from mid-June until Labor Day to help interpret the natural phenomena and to give you other information or assistance.

Fences, railings and signs cannot do the whole job of protecting visitors or guarding natural features. These devices serve as reminders of the need for caution, especially with children.

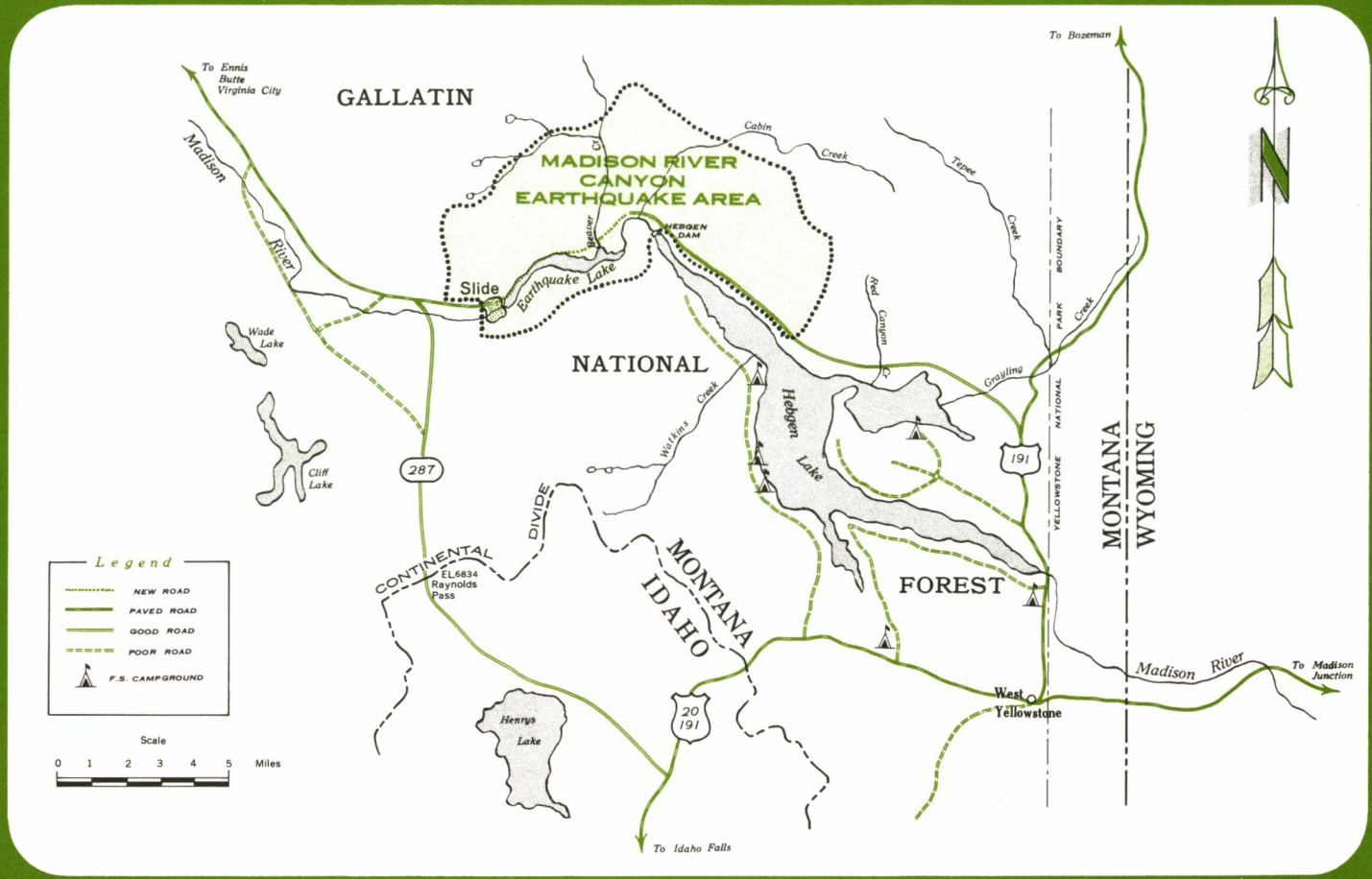
Watch for other traffic, park off the road, and have a pleasant tour . . . and please be careful with fire.

Gallatin National Forest • Bozeman, Montana

REV. 1963


ENTERING
MADISON RIVER CANYON EARTHQUAKE AREA
THIS 37, 800-ACRE AREA HAS BEEN SET ASIDE BY THE U. S. FOREST SERVICE TO PRESERVE FOR PUBLIC ENJOYMENT AND SCIENTIFIC STUDY THE MANY NATURAL PHENOMENA RESULTING FROM THE EARTHQUAKE OF AUGUST 17, 1959.
MULTIPLE USE MANAGEMENT OF THE AREA RECOGNIZES THIS PRIMARY USE AND ALLOWS ALSO FOR HARMONIOUS PRODUCTION AND HARVEST OF WATER, TIMBER, FORAGE AND WILDLIFE RESOURCES.
U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
GALLATIN NATIONAL FOREST
U.S.
U.S.

You can drive to the Earthquake Area on either Montana State Highway 287 or U. S. Highway 191. The sketch at the right shows the new highway along Earthquake Lake which permits travel between these two main highways, and gives access to all points of interest in the Earthquake Area.


To Ennis
Butte
Virginia City
GALLATIN
Madison
River
MADISON RIVER
CANYON
EARTHQUAKE AREA
Cabin
Creek
Tepee
Creek
HEBGEN
DAM
Slide
Earthquake Lake
Wade
Lake
NATIONAL
Red
Canyon
Creek
Grayling
Creek
PARK
BOUNDARY
YELLOWSTONE
NATIONAL
Hebgen
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Watkins
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287
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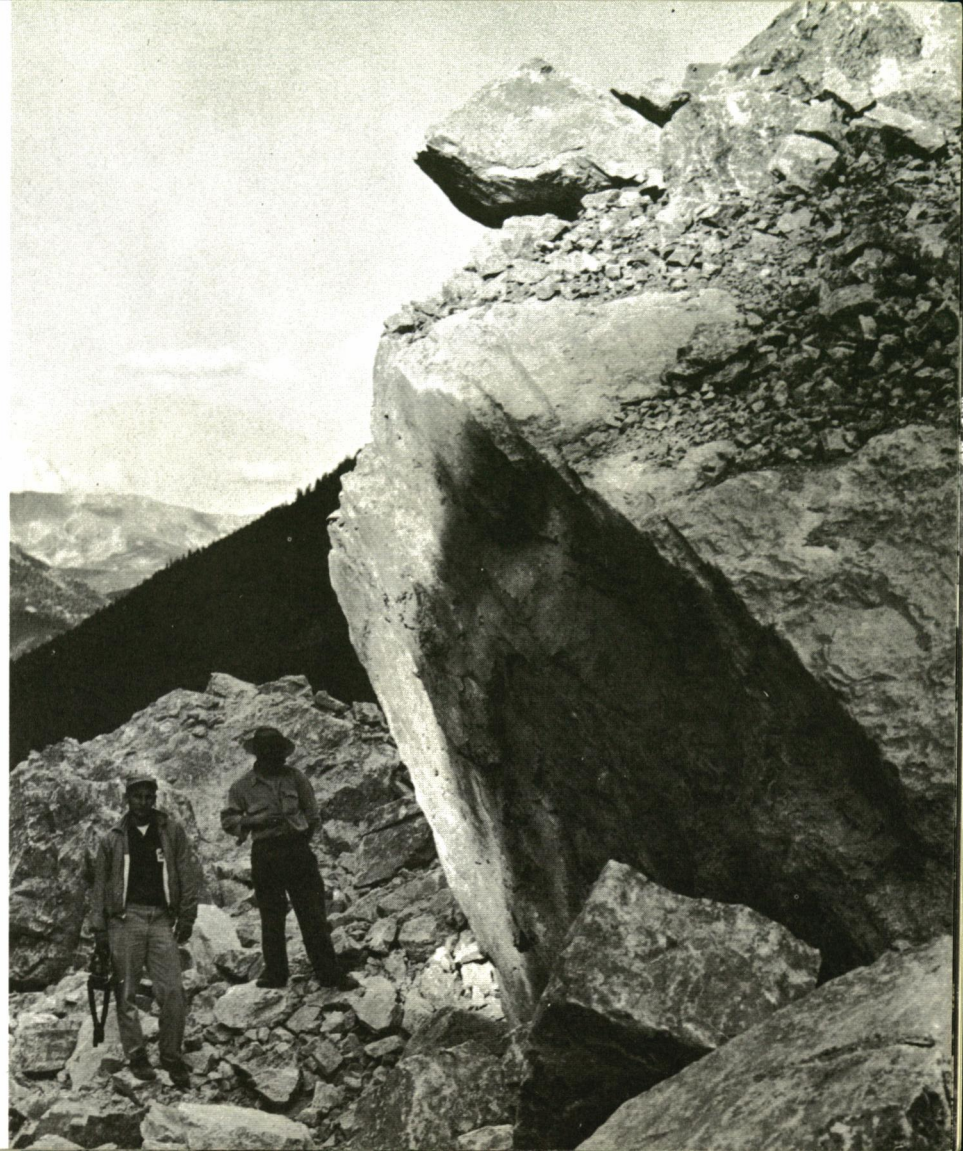
IDAHO
FOREST
MONTANA
WYOMING
Madison
River
To Madison
Junction
West
Yellowstone
Henrys
Lake
20
191
To Idaho Falls
To Bozeman
N
Legend
NEW ROAD
PAVED ROAD
GOOD ROAD
POOR ROAD
F.S. CAMPGROUND
Scale
0 1 2 3 4 5 Miles

THE SLIDE

The most spectacular single feature left by the violent 1959 earthquake is the huge slide across the Madison River near the west end of the area. Rocks and earth – enough to fill one-fifth of the Panama Canal, enough to fill the Rose Bowl heaping full ten times–smashed down into Madison Canyon. A good road leads to the top of the slide; there are parking areas, displays and comfort stations.

A NEW LAKE

The jumbled mass of slide rocks and earth completely blocked the river and caused it to form Earthquake Lake. Before engineers dug a channel through the slide, the new lake was a potential flood threat to towns and ranches downstream. A ring of trees killed by flooding was exposed to view when the channel lowered the lake. You can see Earthquake Lake from the slide, from near Beaver Creek, and from the new road.



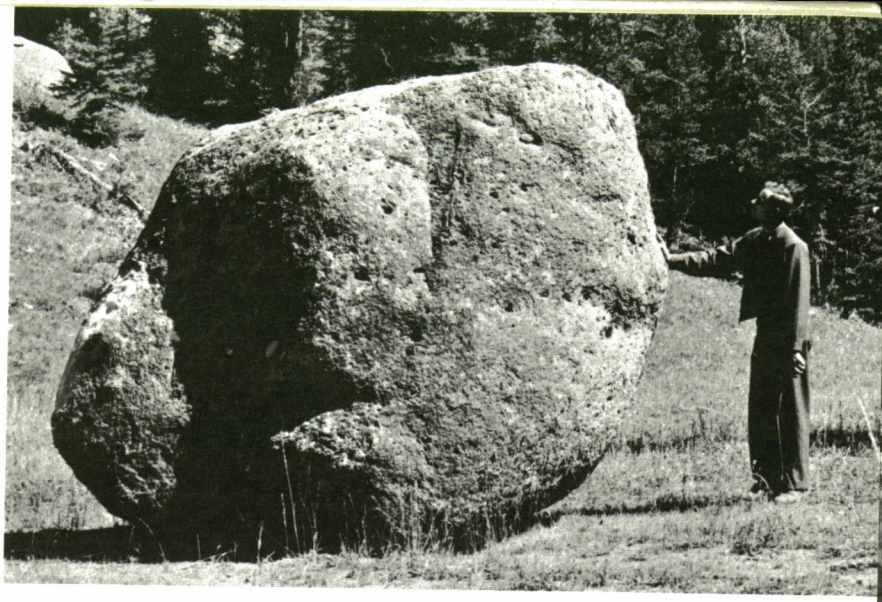
AN OLD LAKE

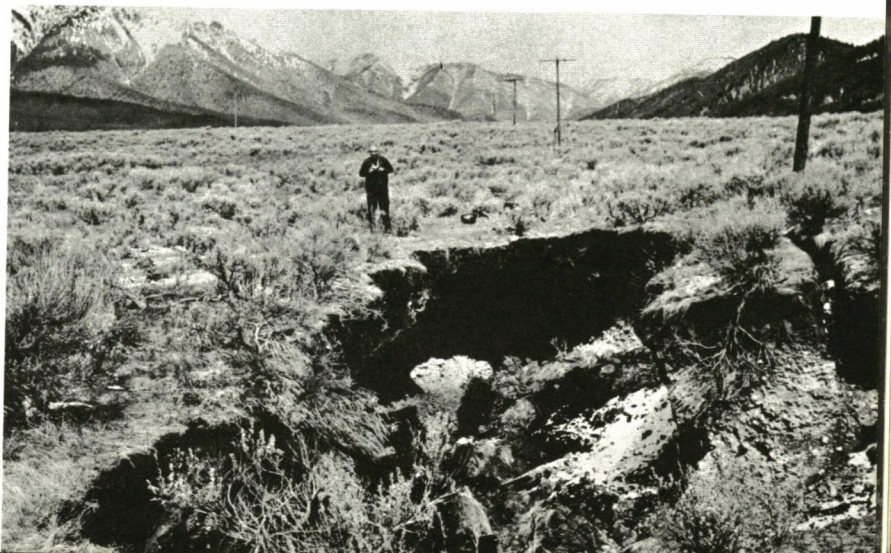
Upstream from the slide and the site of Earthquake Lake, violent shocks lowered one shore of Hebgen Lake and lifted another. The shocks sent huge waves crashing up and down the lake and over the dam. In several places large sections of highway plunged into the lake. Fault scarps, where the earth fractured and dropped, parallel the northeast lake shore for several miles. At Cabin Creek, just downstream from Hebgen Dam, there is an excellent close-up view of the Hebgen Lake fault scarp. A rest center, parking lot, and information signs are located at Cabin Creek. You can drive the length of Hebgen Lake on highway which has been repaired and rerouted around the slipouts.

A SHAPING

The violence of the earthquake was expressed in many ways. You may see numerous subtle as well as dramatic changes in the landscape. The large boulder is one of untold numbers which vaulted down when the earth shook. One fault scarp is nearly 15 miles long; being less conspicuous than the "slip" shown here, it can be missed by the casual observer. Shorter scarps can be seen in many places. The phenomenon shown in the lower right-hand photograph was created when underground water gushed to the surface. Trails, and side roads lead to several such points of interest.

HAND





~~Mr Briegleb~~
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Missoula, Montana
October 3, 1963

Written Information

MEMORANDUM FOR REGIONAL FORESTERS AND DIRECTORS:

Enclosed for your information are two copies of the revised handout brochure describing the Madison River Canyon Earthquake Area on the Gallatin National Forest.

One of these brochures is furnished to each car entering the area. Our count of visitors since 1959 is approaching the 1½-million mark.

BOYD L. RASMUSSEN
Regional Forester, R1

By H. A. Ed.

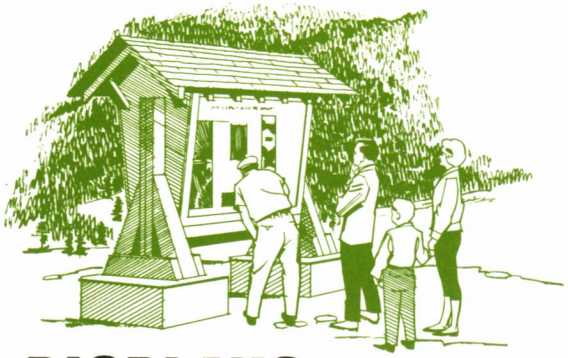
Enclosure

A REFUGE....

REFUGE POINT
SOME 250 PERSONS, TRAPPED IN MADISON CANYON AUGUST 17 AND 18 BY EARTHSLIDES, DESTRUCTION OF ROADS AND RISING WATER, GATHERED IN THE OPENING ON THE RIDGE 100 YARDS SOUTH OF THIS POINT.
MANY ACTS OF KINDNESS, BROTHERHOOD AND MUTUAL HELP WERE PERFORMED. FOREST SERVICE SMOKEJUMPERS PARACHUTED TO THIS POINT TO GIVE FIRST AID AND OTHER ASSISTANCE. THE INJURED WERE FLOWN FROM HERE BY U.S. AIR FORCE AND FOREST SERVICE CONTRACT HELICOPTERS.
U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
GALLATIN NATIONAL FOREST

AND A MEMORIAL

The earthquake brought suffering and tragedy. For some there was final peace and a majestic resting place shaped by the same power that shapes the earth and the destiny of men. On August 17, 1960, one year after the earthquake, the area was dedicated "in memory of the events which took place and as a dramatic example of mountain-building and earth-shaping forces." It was dedicated "for all its values . . . all its resources, its geologic history and its deep human meanings." The monolith shown on page 6 and just visible on the extreme right here, bears a plaque in memory of the 28 persons who lost their lives.



DISPLAYS

Displays and signs give a graphic account of human and geologic events connected with the earthquake. Large signs like the one shown on page 14 are located at most points of interest. Smaller signs give directions, mark less spectacular features, or are safety reminders. Large displays, such as those shown on pages 2 and 7, explain geologic aspects. Photographs of signs and displays plus photographs of natural features make an interesting tour record.

The casual photographer may find these hints helpful: Photograph glass-encased displays close up and at an angle; take the meter reading with the meter held *on* the glass. To photograph wooden signs, take the meter reading 12 to 18 inches from the sign rather than from the camera.

ROADS AND TRAILS

Most major earthquake features can be seen from the canyon highway. Spurs roads lead to private ranches, lodges, 'quake features and to fishing areas. (A state fishing license is required.) Foot paths lead from several parking areas to overlooks and points of interest near the slide and the head of Earthquake Lake. Longer trails afford opportunities to enjoy more remote features, scenery, and wildlife. One trail leads up Cabin Creek from the highway. Another leads from a dirt road in Kirkwood Creek to a badly fractured area. The Red Canyon trail leads from the end of a dirt road to Red Canyon Fault. It is advisable to consult a Forest Ranger before taking dirt roads or the longer trails.

ACCOMMODATIONS

You will find accommodations of various types available in the vicinity of the Madison River Canyon Earthquake Area. Garages, cafes, motels, hotels, stores and other facilities are located at several towns within a two-hour drive of the area. During the busier summer months it may be advisable to make arrangements for commercial sleeping accommodations in advance.

Several small Forest Service public campgrounds are located on or near the southern shores of Hebgen Lake. Others are located within short distances to the east and to the west. Locations of these camps are shown on Forest Service maps available in the Earthquake Area and from Ranger Stations at Ennis and West Yellowstone. New campgrounds are to be built within the area itself.

ACCESS

Madison River Canyon is in a popular vacation area easily reached from major routes in Montana, Idaho and Wyoming. Local access is by way of U. S. Highway 191 between Idaho Falls, Idaho, and Bozeman, Montana; by Montana 287 from Butte, Ennis and Virginia City, Montana. Current highway maps and local inquiry will be helpful in planning a visit to the area. Commercial airlines serve several larger towns in the region. Light aircraft facilities and charter services are available at some towns in the surrounding area. Commercial rail and highway carriers serve many of these communities, and automobile rentals are available.

THE 'QUAKE

It was near midnight on August 17, 1959. The quiet of a soft summer night lay gently over southwestern Montana. Hundreds of vacationers were asleep in camps, trailers and lodges near Hebgen Lake and along the Madison River. At 11:37 the first heavy shock smashed through the night.

Mother Earth was reshaping her mountains in violent response to an agony of deep-seated tensions no longer bearable. An eight-state area felt the first heavy jolt of the Hebgen Lake Earthquake. It was one of the strongest ever recorded in the United States. One physicist has estimated its power was equal to that of 2,500 atomic bombs.

Surface damage extended from near Old Faithful Geyser in Yellowstone National Park westward for about fifty miles. The area of heaviest visible damage is near the two large faults in the Gallatin National Forest and includes the slide, slipouts and scarps pictured on preceding pages. But that first shock was only the beginning. Major aftershocks and hundreds of tremors shook the mountains and plateaus of southwestern Montana and northwestern Wyoming for weeks.

Soon after the main shock, escape from the canyon was blocked. For most of the vacationers there were hours of ordeal yet to come. At dawn a plane made a reconnaissance flight; rescue units from many agencies were soon on the move. Forest Service smokejumpers parachuted into the canyon to give aid and to set up communications. Air Force and Forest Service helicopters removed the injured. By evening bulldozer roads had been built; the immediate emergency was over and all who wished to leave were able to get out of the canyon. As the earth tremors weakened, damage control and repair work started.

EARTH SHAPING

The surface of the earth is shaped by forces which lift, lower, or twist its crust, and by the weathering of water and air. Aside from its profound and tragic effects upon man and his works, the Hebgen Lake Earthquake was merely a repetition of common earth-shaping processes. Stresses and strains in the vicinity of Hebgen Lake were suddenly released by fault movements. The center, or focus, of the first and strongest shock was about 20 miles underground near Red Canyon Creek. Its magnitude of 7.1 compares with the 8.2 magnitude of the San Francisco 'quake.

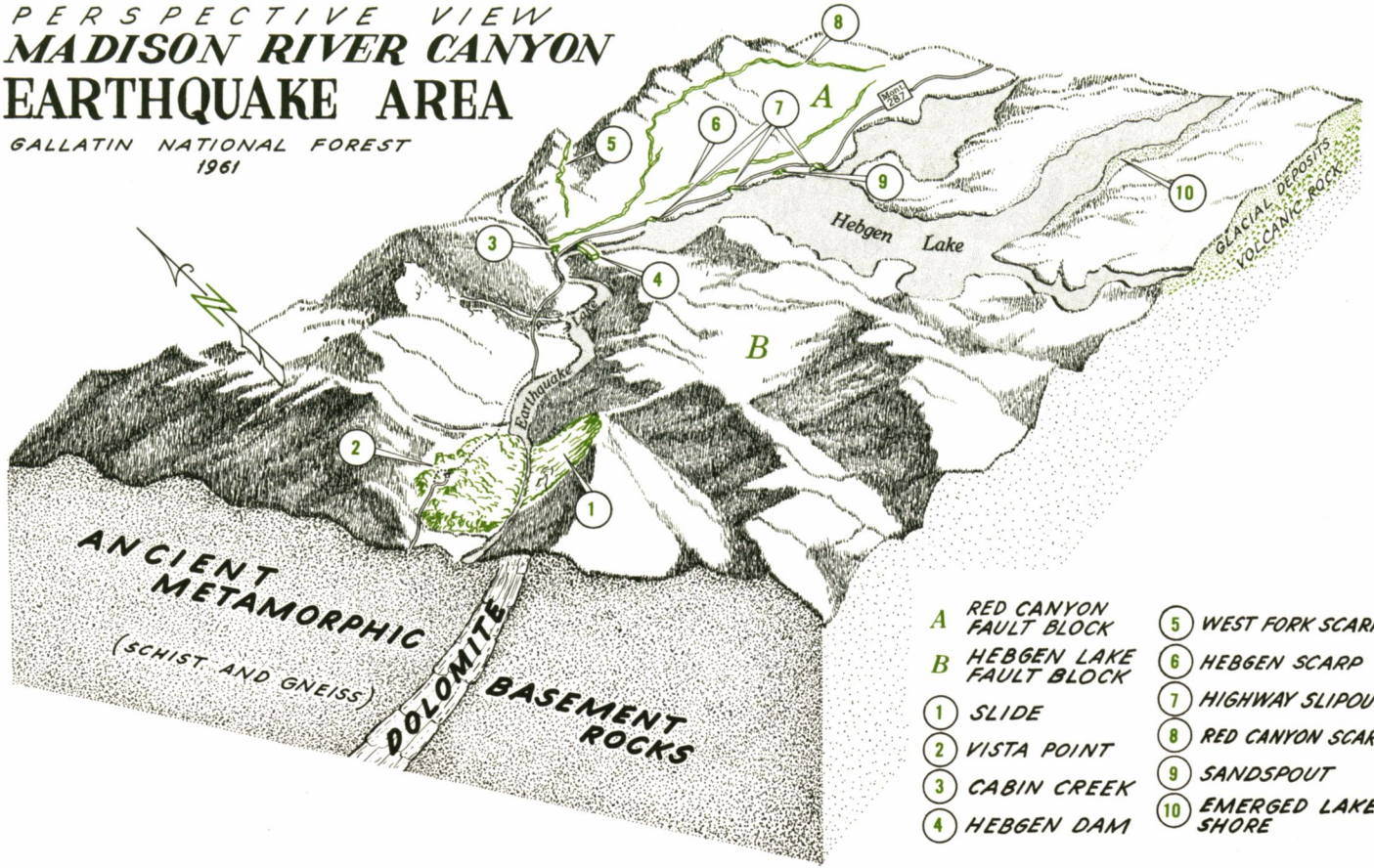
Two large blocks of the earth's crust appear to have been broken and tilted toward the north. Hebgen Lake occupies part of the larger of these two blocks. The Hebgen fault scarp north of the highway and along the north lake shore marks the northernmost edge of this block. The smaller Red Canyon block lies north of Hebgen Lake and is bounded on three sides by the arch-shaped Red Canyon fault scarp.

One of the most awesome results is the landslide which filled the mouth of Madison River Canyon to depths of 200 to 400 feet. Most of the slide is mica-rich metamorphic rocks which formed the upper part of the south ridge before the slide. These soft rocks were held in place by a natural wall of harder dolomite rock. The 'quake evidently caused this retaining wall of harder rock to break, thus allowing the soft rock to slide. The large boulders atop the slide are dolomite.

PERSPECTIVE VIEW

MADISON RIVER CANYON EARTHQUAKE AREA

GALLATIN NATIONAL FOREST
1961



A RED CANYON FAULT BLOCK
B HEBGEN LAKE FAULT BLOCK

1. SLIDE
2. VISTA POINT
3. CABIN CREEK
4. HEBGEN DAM
5. WEST FORK SCARP
6. HEBGEN SCARP
7. HIGHWAY SLIPOUT
8. RED CANYON SCARP
9. SANDSPOUT
10. EMERGED LAKE SHORE

PERSPECTIVE VIEW

Madison River Canyon EARTHQUAKE AREA

GALLATIN NATIONAL FOREST